

EFFECT OF ORGANIC AND INORGANIC ON GROWTH AND ECONOMIC OF TOMATO (*LYCOPERSICON ESCULENTUM* MILL.) CV. HEEM SOHNA UNDER PROTECTED CULTIVATION

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ABSTRACT

The experiment was carried out in vegetable Research Farm, during Mid-November to 8- May with following combination of which was T₁ (control), T₂ (FYM 1.5 kg / m²), T₃ (FYM 2.5 kg / m²), T₄ (30.86 g N, 18.51 g P and 18.51 g K) / m², T₅ (30.86 g N, 18.51 g P and 18.51 g K) / m² + FYM 1.5 kg / m², T₆ (30.86 g N, 18.51 g P and 18.51 g K) / m² + FYM 2.5 kg / m², T₇ (46.29 g N, 37.02 g P and 37.02 g K) / m², T₈ (46.29 g N, 37.02 g P and 37.02 g K) / m² + FYM 1.5 kg / m², T₉ (46.29 g N, 37.02 g P and 37.02 g K) / m² + FYM 2.5 kg / m², T₁₀ (Micronutrient 2.5ml/l) T₁₁ (FYM 1.5 kg / m² + Micronutrient 2.5ml/l), T₁₂ (FYM 2.5 kg / m² + Micronutrient 2.5ml/l), T₁₃ (30.86 g N, 18.51 g P and 18.51 g K) / m² + Micronutrient 2.5ml/l), T₁₄ (30.86 g N, 18.51 g P and 18.51 g K) / m² + FYM 1.5 kg / m² + Micronutrient 2.5ml/l), T₁₅ ((30.86 g N, 18.51 g P and 18.51 g K) / m² + FYM 2.5 kg / m² + Micronutrient 2.5ml/l), T₁₆ (46.29 g N, 37.02 g P and 37.02 g K) / m² + Micronutrient 2.5ml/l), T₁₇ (46.29 g N, 37.02 g P and 37.02 g K) / m² + FYM 1.5 kg / m² + Micronutrient 2.5ml/l) and T₁₈ (46.29 g N, 37.02 g P and 37.02 g K) / m² + FYM 2.5 kg / m² + Micronutrient 2.5ml/l).The cultivar of tomato was "heem shona" syngenta company. The highest high plant (2.83 m) was recorded in T₁₈ and the highest No. leaves per plant (41.33), dry weight of plant (248.67g) and the maximum benefit : cost ratio (5.53) was obtained in T₁₈ treatment.

KEYWORDS: Tomato, *Lycopersicon esculentum* Mill, Plant Height, Leaves Number, Dry Weight, Benifit, Cost Ratio and "Heem Sohna"

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) belongs to family solanaceae having chromosome number (2n=24), it is a self pollinated crop. Tomato one of most popular and nutritious fruit vegetable; widely grown around the world and second ranked after potato. Tomato has its origin in Peru, Ecuador and Bolivia on the basis of availability of numerous wild and cultivated relatives of the tomato in this area. From its centre of origin, the tomato first moved to Mexico for domestication and cultivation. From Mexico it arrived in Europe by 1554. The major tomato growing countries are China, India, USA, Turkey, Egypt, and Italy, In the world total area under tomato is 4582438 thousand ha with production of 150513813 thousand tones and with productivity of 32.8 tones/ha in 2010 - 2011. Total area under tomato crop in India is assessed to be 0.865 million ha with the productivity of (16.826.000 tones) with productivity of 19.5 tones/ha [5].

Tomato is consumed fresh and also in processed form of which one-third is used as processed products and two-third of tomato fruit is consumed fresh. The area under tomato is constantly increasing to produce more quality yield because it is a major vegetable in the menu of human diet. The fruits are eaten raw or cooked, large quantities of tomato are used to produce soup, juice, ketchup, puree, paste and powder. Tomato is a rich source of vitamin, minerals, organic acids, sugars, ascorbic acids, acidity and lycopene. Nutritive value varies in different cultivars depending upon the agro-climatic condition. It is also rich in nutrients and calories. It is a good source of Fe and vitamin A, B, and C. A. Edible portion of Tomato contain. Energy 18 kcal, protein 0.95 g, fat 0.11g, carbohydrate 4.01 g, sugars total 2.49 g, Ca 11mg, Fe 0.68 mg, Mg 9 mg, P 28 mg, K 218 mg, Na 11 mg, Zn 0.14 mg, Vitamin C 22.8 mg, Thiamin 0.036 mg, Riboflavin 0.022 mg, Vitamin B-6 0.079 mg, Vitamin E 0.56 mg, Fatty acids, total saturated 0.015 g, Fatty acids, total polyunsaturated 0.044 g per 100 g [12]. Consumption of tomato and its products can significantly reduce the risk of developing of colon, rectal, and stomach cancer. Recent studies suggest that tomatoes contain the antioxidant lycopene, the most common form of carotenoid, which markedly reduces the. Risk of prostate cancer [6].

To improve the yield and quality of the produce, it is necessary to pay attention on the optimum balanced use of nutrients through fertilizer application. Tomato requires large quantities of both organic and inorganic nutrients are required for economic yields of tomato. Nitrogen, phosphate, potash, FYM and micronutrient are important for tomato. Fertilizers play a key role in the production of both quantity and quality tomato. Tomato plants should be providing with adequate fertilizer Nitrogen, phosphorus and potassium are the main elements which affect on growth, yield and quality of tomato plants. Effect of nitrogen on vegetative and fruit yield is more obvious than other nutrients, as it promotes the setting of flowers and fruits. Nitrogen is the most commonly used mineral nutrient. It is important for protein production. It plays a pivotal role in many critical functions (such as photosynthesis) in the plant and is a major component of amino acids, These amino acids are then used in forming protoplasm, the site of cell division and plant growth. Nitrogen is necessary for enzymatic reactions in plants. It is a necessary component of several vitamins, N is part of the nucleic acids (DNA and RNA).

Phosphorous has pronounced effect on tomato plant, level of available Phosphorous throughout the root zone is essential for root development and good utilization of water and other nutrients by the plant, component of ATP and transfer energy. The need of tomato plants for potassium, Potassium has been found to improve the quality of tomato fruits, regulation of water and nutrient movement, promote flowering and fruiting. Plants require mineral elements for normal growth and development. Plants require to essential for the normal life processes of plants and are needed in very small amounts are called trace elements or minor elements such as boron, zinc and magnesium etc. Boron play an essential role in the development and growth of new cell in the plant meristem, improve of fruit quality and fruit set. Zinc is involved in many enzymatic activities and IAA formation to increase flower number and fruit set. Mg is primary constituent of chlorophyll and ATP require Mg. organic manure have the capability of supplying a range of nutrients and improving the physical and biological properties of the soil such as Farm yard manure (FYM) refers to decomposed mixture of dug and urine of farm animals along with the litter and left over material from roughages or fodder fed the cattle.

On the average well rotted FYM contains 0.5 per cent N, 0.2 percent P_2O_5 and 0.5 per cent K_2O , organic manures are very important for plant and healthy human and create of clean environmental. Therefore, obvious choice is to maintain a natural balance for having a good health and to keep clean environment. Application of organic / inorganic fertilizer in a balance form, which is important to agriculture produce natural. Tomato is a warm season crop and requires relatively long

season to produce a profitable crop. it is highly susceptible to frost. Environment factors such as temperature and moisture etc. markedly influence the process of fruit set of tomato and subsequent in fruit development and yield [3]. The optimum temperature for most varieties between 18 to 24 °C. But the plant tissues are damaged below 10 °C and above 38 °C. keeping all the fact in view, a field experiment entitled To study effect of FYM, NPK and micronutrients on growth and economic of tomato (*Lycopersicon esculentum* Mill.) under protected cultivation on hybrid. indeterminate variety heem sohna, syngenta company.

MATERIAL AND METHODS

The present investigation “Effect of FYM, N P K and Micronutrients on growth and economic of tomato (*Lycopersicon esculentum* Mill.) under protected cultivation” was carried out during winter season during mid-November to 8- may the year 2012 - 2013 at Vegetable Research Farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology & Science Allahabad (U.P.), The experiment was laid out in split plot design with three replications and eighteen treatments.

Treatments Detail

T1	(Control)
T2	FYM 1.5 kg / m ²
T3	FYM 2.5 kg / m ²
T4	(30.86 g N, 18.51 g P and 18.51 g K) / m ²
T5	(30.86 g N, 18.51 g P and 18.51 g K) / m ² + FYM 1.5 kg / m ²
T6	(30.86 g N, 18.51 g P and 18.51 g K) / m ² + FYM 2.5 kg / m ²
T7	(46.29 g N, 37.02 g P and 37.02 g K) / m ²
T8	(46.29 g N, 37.02 g P and 37.02 g K) / m ² + FYM 1.5 kg / m ²
T9	(46.29 g N, 37.02 g P and 37.02 g K) / m ² + FYM 2.5 kg / m ²
T10	Micronutrient 2.5ml/l
T11	FYM 1.5 kg / m ² + Micronutrient 2.5ml/l
T12	FYM 2.5 kg / m ² + Micronutrient 2.5ml/l
T13	(30.86 g N, 18.51 g P and 18.51 g K) / m ² + Micronutrient 2.5ml/l
T14	(30.86 g N, 18.51 g P and 18.51 g K) / m ² + FYM 1.5 kg / m ² + Micronutrient 2.5ml/l
T15	(30.86 g N, 18.51 g P and 18.51 g K) / m ² + FYM 2.5 kg / m ² + Micronutrient 2.5ml/l
T16	(46.29 g N, 37.02 g P and 37.02 g K) / m ² + Micronutrient 2.5ml/l
T17	(46.29 g N, 37.02 g P and 37.02 g K) / m ² + FYM 1.5 kg / m ² + Micronutrient 2.5ml/l
T18	(46.29 g N, 37.02 g P and 37.02 g K) / m ² + FYM 2.5 kg / m ² + Micronutrient 2.5ml/l

A normal sized flat bed (1.0 m × 1.0 m) was prepared in the departmental nursery on 7 October 2012.

After arriving seedling to second true leaves, uniform size and healthy seedlings were selected for the transplanting into the sack to planting seedling separately after arriving to the forth true leaves transplanting was done into the main field. The fertilizer was applied @ recommended dose viz., 30.86 g N, 18.51 g P₂O₅ and 18.51 g K₂O per m² and 46.29 g N, 37.02 g P₂O₅ and 37.02 g K₂O per m² half of the dose of nitrogen and entire quantity of P and K were applied as a basal dose before transplanting and well mixed with the soil and adding 1.5 kg and 2.5 kg farm yard manure (FYM) per m² according to the treatments. Remaining dose of nitrogen was applied at 40 days after transplanting, micronutrient @ 2.5 ml / l was sprayed at two weeks after transplanting and at flowering, The fertilizers were given in the form of urea, SSP and MOP, FYM and Micronutrient SONAMIN - L

RESULTS AND DISCUSSIONS

Plant Height

The data presented in table 1 clearly showed that the micronutrient played significant role in affecting plant height. The maximum plant high was recorded statistically significant in micronutrient application @2.5 ml/l which was recorded (2.23 m) which was superior over control (2.03 m). Result showed that NPK significantly affected on plant height where NPK levels superior over control, where (46.29 g/m²) level gave highest plant height (2.40 m), followed by @ 30.86 g/m² (2.14 m). The minimum plant height was noticed with control (1.84 m). Result showed that FYM significantly affected on plant height where FYM levels superior over control. Where (2.5 kg/m²) level gave highest plant height (2.42 m), followed by @ 1.5 kg/m² (2.15 m). The minimum plant height was noticed with control (1.82 m). The interaction between NPK and micronutrient played significant role in affecting plant height, where superior interaction (46.29 g/m² NPK + 2.5 ml/l micronutrient) on other interaction which was recorded (2.56 m), followed by @ 46.29 g/m² NPK only (2.25 m).

The minimum plant height was noticed with control (1.77 m). FYM combination with micronutrient played significant role in affecting plant height, where superior interaction (2.5 kg/m² FYM + 2.5 ml/l micronutrient) on other interaction which was recorded (2.54 m), followed by @ 2.5 kg/m² FYM only (2.29 m). The minimum plant height was noticed with control (1.76 m). FYM combination with NPK played significant role in affecting plant height, where superior interaction (2.5 kg/m² FYM + 46.29 g/m² NPK) on other interaction which was recorded (2.64 m), followed by @ 2.5 kg/m² FYM + 30.86 g/m² NPK (2.51 m). The minimum plant height was noticed with control (1.62 m). The maximum plant height (2.83 m) was indicated in interaction between FYM₂ and NPK₂ under M₁, followed by @ FYM₁ and NPK₂ under M₁ (2.70 m). The minimum plant height was noticed with control (1.57 m). These result are in close conformity with the finding of [8] and [11].

Number of Leaves

The data presented in table 2 clearly showed micronutrient played significant role in affecting leaves number. The maximum leaves number was recorded statistically significant in micronutrient application @ 2.5 ml/l which was recorded (34.17) superior over control which was recorded (32.24). Result showed that NPK significantly affected on leaves number, where NPK levels superior over control, where (46.29 g. m²) level gave highest leaves number (35.86), followed by @ 30.86 g/m² (33.61). The minimum leaves number (30.14) was noticed with control.

Result showed that FYM significantly affected on leaves number, where FYM levels superior over control, where (2.5 kg/m²) level gave highest leaves number (35.92), followed by @ 1.5 kg/m² (33.72). The minimum leaves number was

noticed with control (29.97). NPK combination with micronutrient played significant role in affecting leaves number, where superior interaction ($46.29 \text{ g/m}^2 \text{ NPK} + 2.5 \text{ ml/l}$ micronutrient) on other interaction which was recorded (37.44), followed by @ $46.29 \text{ g/m}^2 \text{ NPK}$ only (34.28). The minimum leaves number was noticed with control (29.28). FYM combination with micronutrient played significant role in affecting leaves number where, superior interaction ($2.5 \text{ kg/m}^2 \text{ FYM} + 2.5 \text{ ml/l}$ micronutrient) on other interaction which was recorded (37.22), followed by @ $2.5 \text{ kg/m}^2 \text{ FYM}$ only (34.61). The minimum leaves number was noticed with control (29.17). FYM combination with NPK played significant role in affecting leaves number where, superior interaction ($2.5 \text{ kg/m}^2 \text{ FYM} + 46.29 \text{ g/m}^2 \text{ NPK}$) on other interaction which was recorded (38.42), followed by @ $2.5 \text{ kg/m}^2 \text{ FYM} + 30.86 \text{ g/m}^2 \text{ NPK}$ (36.08). The minimum leaves number was noticed with control (25.58). The maximum leaves number (41.33) was indicated in interaction between FYM_2 and NPK_2 under M_1 followed by @ FYM_1 and NPK_2 under M_1 (37.33). The minimum leaves number was noticed with control (23.83). These result are in close conformity with the finding of [8] and [10]

Dry Weight of Plant (g)

The data presented in table 3 clearly showed that the micronutrient played significant role in affecting dry weight. The maximum dry weight was recorded statistically significant in micronutrient application @ 2.5 ml/l which was recorded (185.21 g), superior over control which was recorded (169.63 g). Result showed that NPK significantly affected on dry weight, where NPK levels superior over control, where (46.29 g/m^2) level gave highest dry weight (202.14 g), followed by @ 30.86 g/m^2 (178.56 g). The minimum dry weight (151.56 g) was noticed with control. Result showed that FYM significantly affected on dry weight, where FYM levels superior over control, where (2.5 kg/m^2) level gave highest dry weight (202.79 g), followed by @ 1.5 kg/m^2 (179.03 g).

The minimum dry weight (150.44 g) was noticed with control. NPK combination with micronutrient played significant role in affecting dry weight where superior interaction ($46.29 \text{ g/m}^2 \text{ NPK} + 2.5 \text{ ml/l}$ micronutrient) on other interaction which was recorded (215.25 g), followed by @ $46.29 \text{ g/m}^2 \text{ NPK}$ only (189.03 g). The minimum dry weight was noticed with control (144.59 g). FYM combination with micronutrient played significant role in affecting dry weight, where superior interaction ($2.5 \text{ kg/m}^2 \text{ FYM} + 2.5 \text{ ml/l}$ micronutrient) on other interaction which was recorded (214.09 g), followed by @ $2.5 \text{ kg/m}^2 \text{ FYM}$ only (191.50 g). The minimum dry weight was noticed with control (143.38 g). FYM combination with NPK played significant role in affecting dry weight, where superior interaction ($2.5 \text{ kg/m}^2 \text{ FYM} + 46.29 \text{ g/m}^2 \text{ NPK}$) on other interaction which was recorded (225.00 g), followed by @ $2.5 \text{ kg/m}^2 \text{ FYM} + 30.86 \text{ g/m}^2 \text{ NPK}$ (200.17 g). The minimum dry weight was noticed with control (119.43 g). The maximum dry weight (248.67 g) was indicated in interaction between FYM_2 and NPK_2 under M_1 , followed by @ FYM_1 and NPK_2 under M_1 (211.77 g). The minimum dry weight was noticed with control (103.33 g). These result are in close conformity with the finding of [4].

Economics of the Treatments

The data presented in table 6. The maximum benefit: cost ratio (5.53) was observed in T_{18} ($2.5 \text{ kg/m}^2 \text{ FYM} + 46.29 \text{ g/m}^2 \text{ NPK} + 2.5 \text{ ml/l}$ micronutrient), followed by (5.11) with T_{17} ($1.5 \text{ kg/m}^2 \text{ FYM} + 46.29 \text{ g/m}^2 \text{ NPK} + 2.5 \text{ ml/l}$ micronutrient). The minimum benefit: cost ratio was observed in control (1.02). These result are in close conformity with the finding of [1] and [13]

CONCLUSIONS

Based on the result of experiment it was aimed to identify suitable treatment for tomato with respect to growth

and economic of tomato during November to May it may be concluded that the treatment T₁₈ (2.5kg. m² FYM + 46.29 gm² NPK + 2.5 ml. l⁻¹ micronutrient) was recorded the best among treatment combinations on growth and economic. The treatment T₁₈ was obtained The highest High plant (2.83 m) and the highest No.of leaves per plant (41.33), dry weight of plant (248.67g) and the maximum benefit: cost ratio (5.53).

DISCUSSIONS

Despite its economic importance, growers are not in a position to produce high productivity due to various biotic (pest and diseases), abiotic (rainfall, temperature, relative humidity and light intensity) and crop factors (flower and fruit drop). Due to erratic behavior of weather, the crops grown in open field are often exposed to fluctuating levels of temperature, humidity, wind flow etc. Besides this, limited availability of land for cultivation hampers the vegetable production. Hence, to obtain a good production during off season, there is a need to cultivate tomato under protected conditions such as green house, poly house and net house etc.

The integration of organic manures such as FYM in combination with inorganic fertilizers NPK and micronutrients was found significant in improving the overall plant growth, yield and benefit – cost ratio than the sole application of either of these nutrients. This combination result in solubilization of plant nutrients which lead to increased up take of NPK. Mixing of organic and inorganic nutrients reduce the nutrient losses, improving the fertilizer use efficiency thus increasing the soil nutrient availability. And involved in cell division, photosynthesis, metabolism of carbohydrates, regulated proper translocation of photosynthesis and stimulated enzyme activity which in turn might have increased the rate of growth and positive development in yield characters which is resulted in high growth and benefit – cost ratio of tomato Further, application of organic manure along with N P K and micronutrient which might have accelerated the vigorous growth,yield and increase benefit – cost ratio of tomato plant. It is also relevant to mention that tomato plants nourished with interaction among NPK, FYM under micronutrient gave maximum growth, yield parameter which is result to increase benefit – cost ratio.

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APPENDICES

Table 1: Effect of FYM, N P K and Micronutrients on Plant Height of Tomato (*Lycopersicon esculentum* Mill)

Treatments		Plant Height of Tomato	Treatments	Plant Height of Tomato		
Main Plot (M)				Npk ₀	Npk ₁	Npk ₂
M ₀		2.03	M ₀	1.77	2.06	2.25
M ₁		2.23	M ₁	1.91	2.22	2.56
	F – test	S	F – test		S	
	S. Ed. (±)	0.007	S. Ed. (±)		0.034	
	CD at 5%	0.029	CD at 5%		0.078	
Sub Plot NPK (I)			Treatments	F ₀	F ₁	F ₂
NPK ₀		1.84	M ₀	1.76	2.02	2.29
NPK ₁		2.14	M ₁	1.87	2.28	2.54
NPK ₂		2.40			S	
	F – test	S	F – test		0.019	
	S. Ed. (±)	0.024	S. Ed. (±)		0.040	
	CD at 5%	0.055	CD at 5%			
Sub Sub Plot FYM (F)			Treatments	F ₀	F ₁	F ₂
F ₀		1.82	NPK ₀	1.62	1.81	2.10
F ₁		2.15	NPK ₁	1.76	2.15	2.51
F ₂		2.42	NPK ₂	2.08	2.49	2.64
	F – test	S	F – test		S	
	S. Ed. (±)	0.014	S. Ed. (±)		0.024	
	CD at 5%	0.028	CD at 5%		0.049	
Treatments	Plant Height of Tomato					
	M ₀			M ₁		
	NPK ₀	NPK ₁	NPK ₂	NPK ₀	NPK ₁	NPK ₂
F ₀	1.57	1.70	2.02	1.67	1.82	2.13
F ₁	1.70	2.08	2.28	1.92	2.22	2.70
F ₂	2.05	2.38	2.45	2.15	2.63	2.83
F – test			S			
S. Ed. (±)			0.034			
CD at 5%			0.069			

Table 2: Effect of FYM, NPK and Micronutrients on of Leaves Number of Tomato (*Lycopersicon esculentum* Mill)

Treatments		Leaves Number of Tomato	Treatments	Leaves Number of Tomato		
Main Plot (M)				Npk ₀	Npk ₁	Npk ₂
M ₀		32.24	M ₀	29.28	33.17	34.28
M ₁		34.17	M ₁	31.00	34.06	37.44
	F – test	S	F – test		S	
	S. Ed. (±)	0.145	S. Ed. (±)		0.285	
	CD at 5%	0.622	CD at 5%		0.657	
Sub Plot NPK (I)			Treatments	F ₀	F ₁	F ₂
NPK ₀		30.14	M ₀	29.17	32.94	34.61
NPK ₁		33.61	M ₁	30.78	34.50	37.22
NPK ₂		35.86			S	
	F – test	S	F – test		0.183	
	S. Ed. (±)	0.202	S. Ed. (±)		0.377	
	CD at 5%	0.465	CD at 5%			
Sub Sub Plot FYM (F)			Treatments	F ₀	F ₁	F ₂
F ₀		29.97	NPK ₀	25.58	31.58	33.25
F ₁		33.72	NPK ₁	31.08	33.67	36.08
F ₂		35.92	NPK ₂	33.25	35.92	38.42
	F – test	S	F – test		S	
	S. Ed. (±)	0.129	S. Ed. (±)		0.224	
	CD at 5%	0.267	CD at 5%		0.462	
Treatments	Leaves Number of Tomato					
	M ₀			M ₁		
	NPK ₀	NPK ₁	NPK ₂	NPK ₀	NPK ₁	NPK ₂
F ₀	23.83	30.83	32.83	27.33	31.33	33.67
F ₁	31.00	33.33	34.50	32.17	34.00	37.33
F ₂	33.00	35.33	35.50	33.50	36.83	41.33
F – test			S			
S. Ed. (±)			0.317			
CD at 5%			0.654			

Table 3: Effect of FYM, NPK and Micronutriments on Dry Weight of Tomato Plant (*Lycopersicon esculentum* Mill)

Treatments		Dry Weight of Tomato	Treatments	Dry Weight of Tomato		
Main Plot (M)				Npk ₀	Npk ₁	Npk ₂
M ₀		169.63	M ₀	144.59	175.27	189.03
M ₁		185.21	M ₁	158.53	181.86	215.25
	F – test	S	F – test		S	
	S. Ed. (±)	0.106	S. Ed. (±)		0.717	
	CD at 5%	0.457	CD at 5%		1.654	
Sub Plot NPK (I)			0.029	F ₀	F ₁	F ₂
NPK ₀		151.56	M ₀	143.38	174.01	191.50
NPK ₁		178.56	M ₁	157.49	184.05	214.09
NPK ₂		202.14			S	
	F – test	S	F – test		1.247	
	S. Ed. (±)	0.507	S. Ed. (±)		2.574	
	CD at 5%	1.170	CD at 5%			
Sub Sub Plot FYM (F)			Treatments	F ₀	F ₁	F ₂
F ₀		150.44	NPK ₀	119.43	152.04	183.22
F ₁		179.03	NPK ₁	150.20	185.33	200.17
F ₂		202.79	NPK ₂	181.69	199.73	225.00
	F – test	S	F – test		S	

Table 3: Contd.

	S. Ed. ($\pm$)	0.882	S. Ed. ($\pm$)		1.528	
	CD at 5%	1.820	CD at 5%		3.153	
Treatments	Dry Weight of Tomato					
	M₀			M₁		
	NPK₀	NPK₁	NPK₂	NPK₀	NPK₁	NPK₂
F₀	103.33	148.73	178.08	135.52	151.67	185.30
F₁	150.62	183.73	187.68	153.47	186.92	211.77
F₂	179.83	193.33	201.33	186.60	207.00	248.67
F – test			S			
S. Ed. ($\pm$)			2.160			
CD at 5%			4.459			

Table 4: Cost of Cultivation of Tomato per 220 M² (Common Cost for all Treatments)

Particulars	Unit	Qty	Rate/Unit (RS')	Cost Rs/220 m ²
A. Land preparation				
1. Ploughing	hrs	1	500	250
2. Layout of the field	labour	2	150	300
B. Sowing and fertilizer application				
1. cost of seeds	10 g	10g	350	350
2. Labour of seed sowing transplanting and fertilizer application	labour	5	100	500
C. After care and plant protection				
1. Gap filling	labour	1	50	50
2. Four hand weeding	labour	4	100	400
3. Cost of insecticide/pesticide, herbicide	Litre	3	200	600
4. Labour for spraying	labour	3	50	150
D. Irrigation	labour	20	30	600
E. Harvesting, staking and pruning	labour	12	50	600
F. Rental value of poly house	Month	6	2000	12000
	Total common charge	15800		

Table 5: Treatment Wise Cost of Cultivation of Tomato per 220 M²

Treatments	Treatment Cost of NPK, FYM and Micronutrient (Rs.)	Common Cost	Total Cost per 220 M ²
T ₁	0.00	15800.00	15800.00
T ₂	108.00	15800.00	15908.00
T ₃	180.00	15800.00	15980.00
T ₄	144.00	15800.00	15944.00
T ₅	252.18	15800.00	16052.18
T ₆	324.18	15800.00	16124.18
T ₇	268.97	15800.00	16068.97
T ₈	376.97	15800.00	16176.97
T ₉	448.97	15800.00	16248.97
T ₁₀	100.00	15800.00	15900.00
T ₁₁	208.00	15800.00	16008.00
T ₁₂	280.00	15800.00	16080.00
T ₁₃	244.18	15800.00	16044.18
T ₁₄	352.18	15800.00	16152.18
T ₁₅	424.18	15800.00	16224.18
T ₁₆	368.97	15800.00	16168.97
T ₁₇	476.97	15800.00	16276.97
T ₁₈	548.97	15800.00	16348.97

Table 6: Treatment Wise Cost of Cultivation of Tomato per 220 M² and Cross Return
Not: Selling Rate for March, April and May (28,29and 29 Rs/ Kg), Respectively

Treatments	Cost of Cultivation (Rs/220 M ²)	Total Yield Kg / 220m ²			Total Yieldt / 220 M ²	Cross Return Rs/220m ²			Total Cross Return Rs/220m ²	Net Return Rs/220 M ²	Benefit Cost Ratio
		March	April	May		March	April	May			
T1	15800	284	244.2	39.76	0.568	7952	7083	1153	16188	388	1.02
T2	15908	416	357.8	58.24	0.832	11648	10375	1689	23712	7804	1.49
T3	15980	610.5	525	85.47	1.221	17094	15226	2479	34799	18818.5	2.18
T4	15944	386	332	54.04	0.772	10808	9626.8	1567	22002	6058	1.38
T5	16052.18	651.5	560.3	91.21	1.303	18242	16248	2645	37136	21083.3	2.31
T6	16124.18	1050	903	147	2.100	29400	26187	4263	59850	43725.8	3.71
T7	16068.97	582.5	501	81.55	1.165	16310	14528	2365	33203	17133.5	2.07
T8	16176.97	923.5	794.2	129.29	1.847	25858	23032	3749	52640	36462.5	3.25
T9	16248.97	1310	1127	183.4	2.620	36680	32671	5319	74670	58421	4.60
T10	15900	382.5	329	53.55	0.765	10710	9539.6	1553	21803	5902.5	1.37
T11	16008	543	467	76.02	1.086	15204	13542	2205	30951	14943	1.93
T12	16080	774	665.6	108.36	1.548	21672	19304	3142	44118	28038	2.74
T13	16044.18	510	438.6	71.4	1.020	14280	12719	2071	29070	13025.8	1.81
T14	16152.18	805	692.3	112.7	1.610	22540	20077	3268	45885	29732.8	2.84
T15	16224.18	1340.5	1153	187.67	2.681	37534	33432	5442	76409	60184.3	4.71
T16	16168.97	746	641.6	104.44	1.492	20888	18605	3029	42522	26353	2.63
T17	16276.97	1458	1254	204.12	2.916	40824	36363	5919	83106	66829	5.11
T18	16348.97	1586	1364	222.04	3.172	44408	39555	6439	90402	74053	5.53

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